OIPE
JAN 13 2006
IAP83
PATENT & TRADEMARK OFFICE

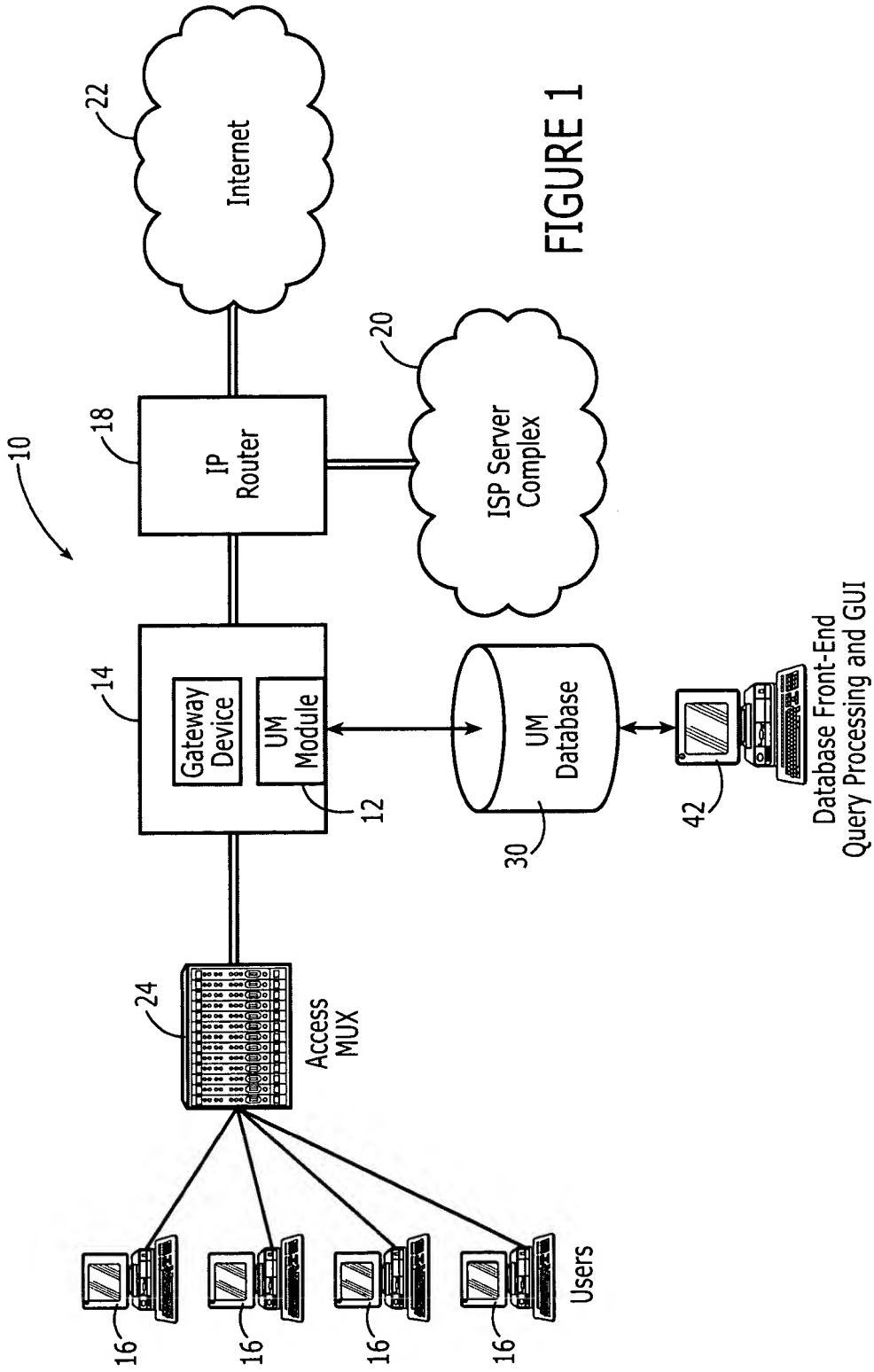

FIGURE 1

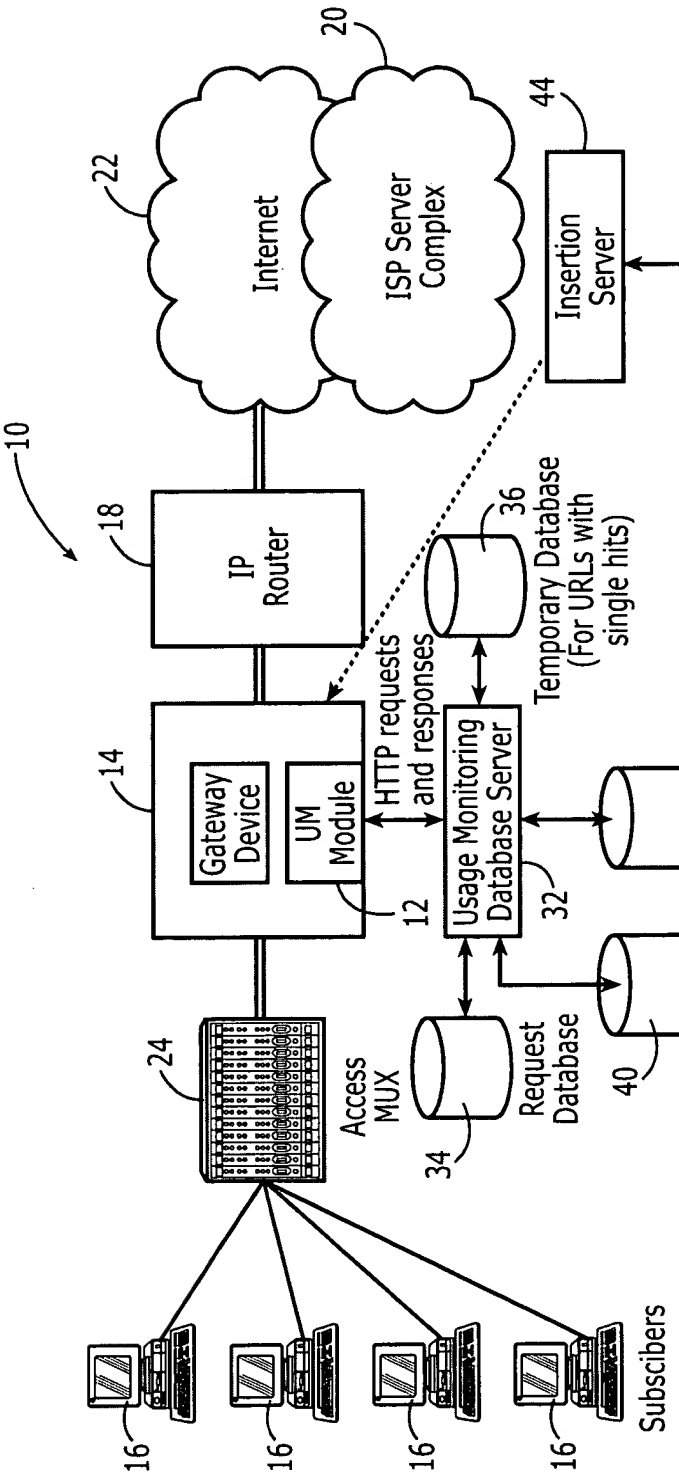
10
20
22
Internet
ISP Server Complex
44
Insertion Server
18
IP Router
36
Temporary Database (For URLs with single hits)
Processing Engine
42
14
Gateway Device
UM Module
HTTP requests and responses
Usage Monitoring Database Server
12
32
Primary Database
38
Database of Designated Network Services
24
Access MUX
Request Database
34
40
16
16
16
16
Subscibers

FIGURE 2

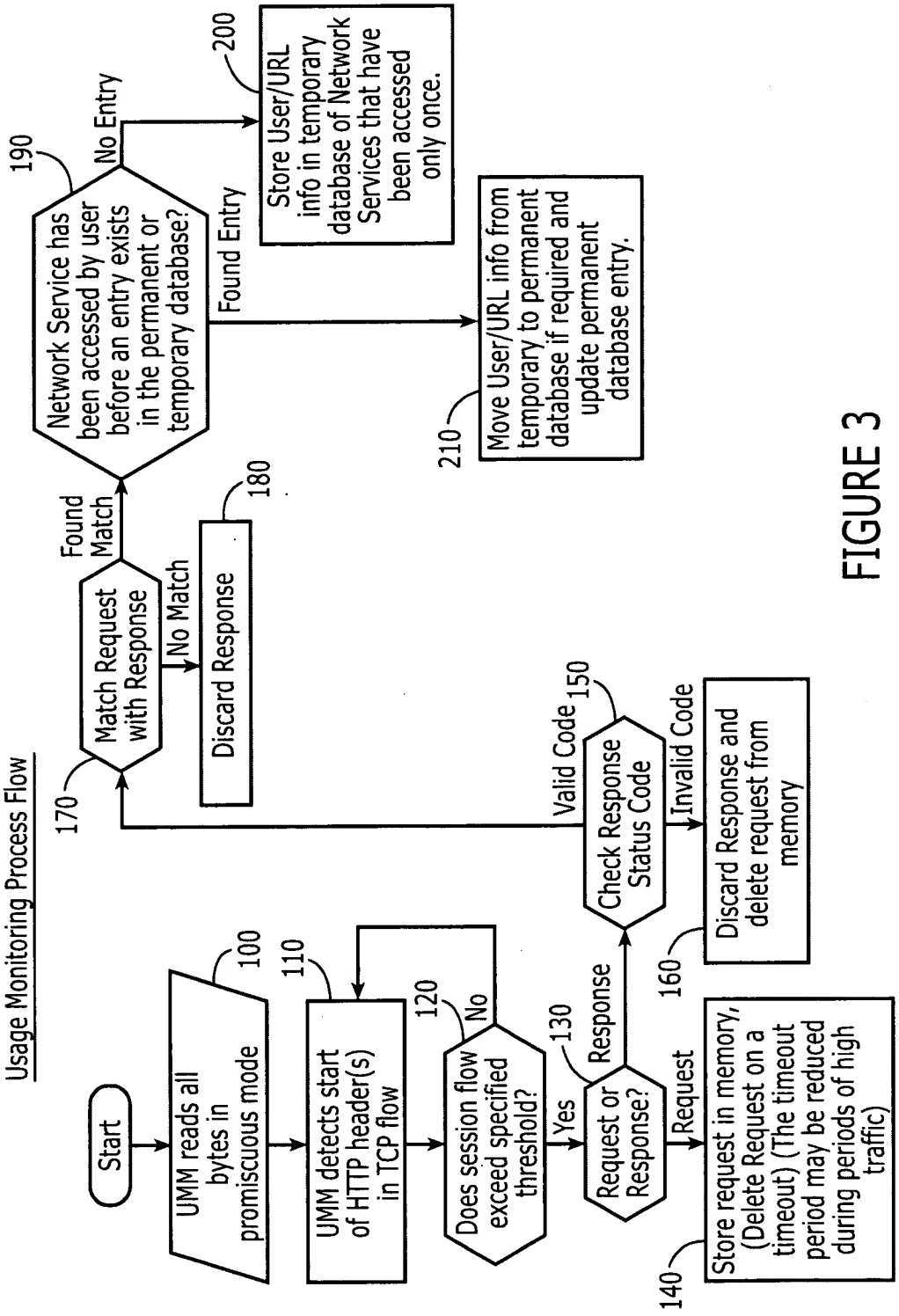
Usage Monitoring Process Flow
Start
UMM reads all bytes in promiscuous mode
100
UMM detects start of HTTP header(s) in TCP flow
110
Does session flow exceed specified threshold?
120
No
Yes
Request or Response?
130
Response
Request
Store request in memory, (Delete Request on a timeout) (The timeout period may be reduced during periods of high traffic)
140
Check Response Status Code
150
Valid Code
Invalid Code
Discard Response and delete request from memory
160
Match Request with Response
170
Found Match
No Match
Discard Response
180
Network Service has been accessed by user before an entry exists in the permanent or temporary database?
190
No Entry
Found Entry
Store User/URL info in temporary database of Network Services that have been accessed only once.
200
Move User/URL info from temporary to permanent database if required and update permanent database entry.
210

FIGURE 3

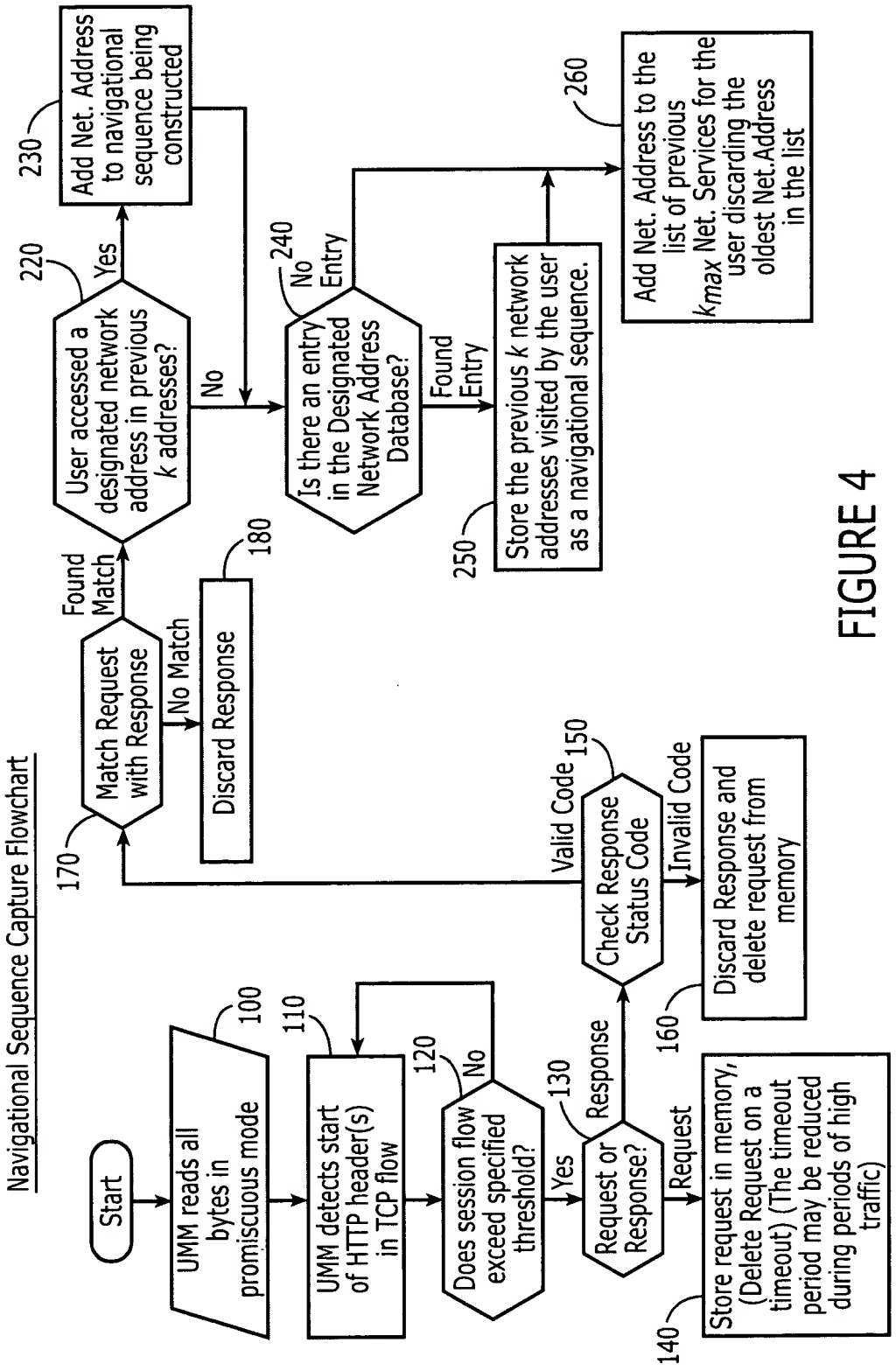
Navigational Sequence Capture Flowchart
Start
UMM reads all bytes in promiscuous mode
100
UMM detects start of HTTP header(s) in TCP flow
110
Does session flow exceed specified threshold?
120
No
Yes
Request or Response?
130
Response
Request
Store request in memory, (Delete Request on a timeout) (The timeout period may be reduced during periods of high traffic)
140
Check Response Status Code
150
Valid Code
Invalid Code
Discard Response and delete request from memory
160
Match Request with Response
170
Found Match
No Match
Discard Response
180
User accessed a designated network address in previous k addresses?
220
Yes
No
Add Net. Address to navigational sequence being constructed
230
Is there an entry in the Designated Network Address Database?
240
No Entry
Found Entry
Store the previous k network addresses visited by the user as a navigational sequence.
250
Add Net. Address to the list of previous k_{max} Net. Services for the user discarding the oldest Net.Address in the list
260

FIGURE 4

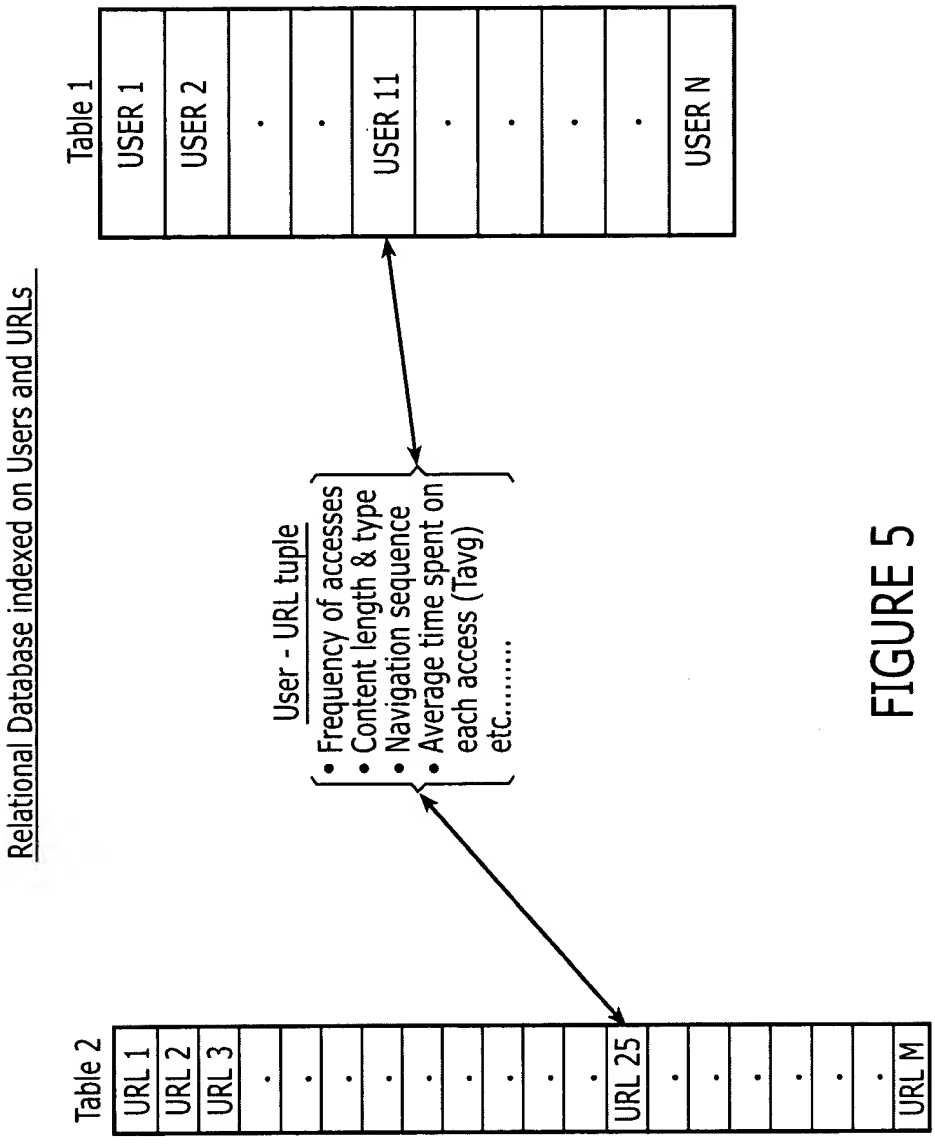
Relational Database indexed on Users and URLs
Table 1
USER 1
USER 2
USER 11
USER N
User - URL tuple
• Frequency of accesses
• Content length & type
• Navigation sequence
• Average time spent on each access (Tavg)
etc.....
Table 2
URL 1
URL 2
URL 3
URL 25
URL M

FIGURE 5